

REMARKS

Examiner A. Moe is thanked for the thorough examination and search of the subject Patent Application. Claims 1, 29, and 38 have been amended. Claims 2, 4-28, 30, 32-37, and 39-42 have been canceled.

All Claims are believed to be in condition for Allowance, and that is so requested.

Reconsideration of Claims 1, 3, 38, 43, 44, 47 and 48 rejected under 35 U.S.C. 103(a) as being unpatentable over Hashimoto (U.S. 4,768,085) in view of Jacobs (U.S. 6,580,456) and Lee et al (U.S. 6,466,265) is requested based on Amended Claims 1 and 38 and on the following remarks.

Applicant notes that the newly cited reference to Jacobs describes a programmable timing generator. Jacobs describes a timing generator circuit for use with a stand-alone CCD or CMOS array device (column 4, lines 33 to 46). This programmable timing generator generates clocking signals to drive horizontal and vertical shift registers 314 and 312 (Fig. 3) in the stand-alone array device. To read a cell within the array, charge must be clocked into a vertical shift register 312, then charge must

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be clocked through this vertical shift register 312 to a horizontal shift register 314. Finally charge is clocked out of the horizontal shift register 314 to an amplifier 320. This architecture is shown in Fig. 3 and described in detail in column 4, line 47 through column 5, line 15.

This architecture is entirely different from that of Applicant's claimed invention. In particular, Fig. 4 clearly does not envision a multiple shift register mechanism to route charge from the sensor cell array to the amplifiers 154, 156, 166, and 172. Rather, Fig. 4 clearly shows a series of switches 150 that are controlled by the column readout controller 146 to provide a direct path from each cell to an amplifier. To further clarify this distinction between Applicant's claimed invention and the cited art, Applicant has amended Claim 1 to now reads:

1. (Currently Amended) A color imaging system providing on-the-fly color interpolation using analog signals to reconstruct colors during sensor readout, the imaging system comprising:

5 an array of pixel sensor elements wherein at least part of the array is arranged in rows and columns;

a color filter including a plurality of color filter components organized in a predefined pattern, the color filter overlaying at least a portion of the array;

10        a readout control circuit coupled to the array wherein the readout control circuit is configured to simultaneously read out values for a group of pixel elements within a first portion of the array, including at least two pixel elements from two different rows and two pixel elements

15        from two different columns and to reconstruct color components for at least a first pixel sensor element and a second pixel sensor element using color information from other pixels elements within at least the first portion of the array while the readout control circuit is reading said

20        first portion of the array and wherein said readout control circuit comprises a pattern generator that is programmed by a digital command; and

            a plurality of color amplifiers each corresponding to one of said color filter components wherein each said color amplifier has a programmable gain wherein said readout control circuit directly couples said pixel sensor elements to said color amplifiers.

Amended Claim 1 makes clear that the readout control circuit

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directly couples the pixel sensor elements to one of the color  
amplifiers. Claim 38 has been similarly amended to make this  
distinction. These amendments are consistent with the original  
Specification and Drawings.

The above-described amendments were made necessary due to  
the new citation of Jacobs. Applicant respectfully requests that  
these amendments, drawn in light of Jacobs, be entered at this  
time. Further, Applicant believes that the present amendments  
make a clear distinction between the teachings of the cited art  
and those of Applicant's claimed invention. Applicant does not  
believe that Hashimoto in view of Jacobs and Lee et al teaches  
or suggests Applicant's claimed invention as recited in Amended  
Claims 1 and 38. Therefore, Applicant respectfully requests that  
Amended Claims 1 and 38 be entered and that these claims not be  
rejected under 35 U.S.C. 103(a). Further, Claims 3, 43, 44, 47  
and 48 represent patentably distinct, further limitations on  
Claims 1 and 38 that should not be rejected under 35 U.S.C.  
103(a).

Reconsideration of Claims 1, 3, 38, 43, 44, 47 and 48  
rejected under 35 U.S.C. 103(a) as being unpatentable over  
Hashimoto (U.S. 4,768,085) in view of Jacobs (U.S. 6,580,456)

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and Lee et al (U.S. 6,466,265) is requested based on Amended  
Claims 1 and 38 and on the above remarks.

Reconsideration of Claim 45 rejected under 35 U.S.C. 103(a)  
as being unpatentable over Hashimoto (U.S. 4,768,085) in view of  
Jacobs (U.S. 6,580,456) and Lee et al (U.S. 6,466,265) as  
applied to the claims discussed above, and further in view of  
Wilder et al (U.S. 5,262,871) is requested based on Amended  
Claim 1 and on the following remarks.

As discussed above, Amended Claim 1 now contains the  
additional limitation, "wherein said readout control circuit  
directly couples said pixel sensor elements to said color  
amplifiers." Hashimoto in view of Jacob and Lee et al and,  
further, in view of Wilder et al do not appear to teach or to  
suggest, separately or in combination, this features as recited  
in Applicant's claimed invention in Amended Claim 1. Therefore,  
Applicant believes that Amended Claim 1 now contains subject  
matter that is neither taught nor suggested in the prior art and  
should, therefore, not be rejected under 35 U.S.C. 103(a). In  
addition, Claim 45 represents a patentably distinct, further  
limitation on Claim 1 and should be in condition for allowance  
if Claim 1 is not rejected.

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Reconsideration of Claim 45 rejected under 35 U.S.C. 103(a) as being unpatentable over Hashimoto (U.S. 4,768,085) in view of Jacobs (U.S. 6,580,456) and Lee et al (U.S. 6,466,265) as applied to the claims discussed above, and further in view of Wilder et al (U.S. 5,262,871) is requested based on Amended Claim 1 and on the above remarks.

Reconsideration of Claims 29 and 31 rejected under 35 U.S.C. 103(a) as being unpatentable over Maenaka et al (U.S. 5,555,023) in view of Jacobs (U.S. 6,580,456) is requested based on Amended Claim 29 and on the following remarks.

Applicant has amended Claim 29 using language essentially similar to that used in amending Claims 1 and 38. In particular, Amended Claim 29 now reads:

29. (Currently Amended) A method of interpolating color components of an array of pixel sensor elements, said method comprising:

reading a first rectangular portion of an array of  
5 pixel sensor elements simultaneously, wherein the first rectangular portion includes pixel sensor elements from at least two array columns and two array rows;

reading a second rectangular portion of the array of  
pixel sensor elements, wherein the second portion partly  
10 overlaps said first portion and wherein said reading of  
said first and second rectangular portions is controlled by  
a pattern generator that is programmed by a digital command  
and wherein said readout control circuit directly couples  
said pixel sensor elements to a color amplifier; and  
15 reconstructing color components using interpolation  
for at least a third portion of the array while said third  
portion of the array is being read wherein said array of  
pixel sensor elements comprises CMOS sensors.

Applicant has reviewed the cited art and does not find this additional limitation that has been added by amendment. In particular, Maenaka and Jacob do not appear to teach or to suggest, separately or in combination, the additional limitation as recited in Applicant's claimed invention in Amended Claim 29. Therefore, Applicant believes that Amended Claim 29, if entered, now contains subject matter that is neither taught nor suggested in the prior art and should, therefore, not be rejected under 35 U.S.C. 103(a). In addition, Claim 31 represents a patentably distinct, further limitation on Claim 29 and should be in condition for allowance if the rejection of Claim 29 is removed.

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Reconsideration of Claims 29 and 31 rejected under 35

U.S.C. 103(a) as being unpatentable over Maenaka et al (U.S. 5,555,023) in view of Jacobs (U.S. 6,580,456) is requested based on Amended Claim 29 and on the above remarks.

Reconsideration of Claim 46 rejected under 35 U.S.C. 103(a) as being unpatentable over Maenaka et al (U.S. 5,555,023) in view of Jacobs (U.S. 6,580,456) and further in view of Lee et al (U.S. 6,466,265) is requested based on Amended Claim 29 and on the following remarks.

Applicant has reviewed the cited art and does not find this additional limitation on Claim 29 that has been added by amendment. In particular, Maenaka in view of Jacob and, further, in view of Lee et al do not appear to teach or to suggest, separately or in combination, the additional limitation as recited in Applicant's claimed invention in Amended Claim 29. Therefore, Applicant believes that Amended Claim 29, if entered, now contains subject matter that is neither taught nor suggested in the prior art and should, therefore, not be rejected under 35 U.S.C. 103(a). In addition, Claim 46 represents a patentably distinct, further limitation on Claim 29 and should be in condition for allowance if the rejection of Claim 29 is removed.

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Reconsideration of Claim 46 rejected under 35 U.S.C. 103(a)

as being unpatentable over Maenaka et al (U.S. 5,555,023) in view of Jacobs (U.S. 6,580,456) and further in view of Lee et al (U.S. 6,466,265) is requested based on Amended Claim 29 and on the above remarks.

Applicants have reviewed the prior art made of record and not relied upon and have discussed their impact on the present invention above.

Allowance of all Claims is requested. It is also requested that should the Examiner not find that the Claims are now Allowable that the Examiner call the undersigned at 989-894-4392 to overcome any problems preventing allowance.

Respectfully submitted,



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